

Large deformation analysis of plates on unilateral elastic foundation

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Abstract: In this technical note, the effect of large deformation on the contact of an axisymmetric circular plate that rests unilaterally on an elastic foundation is investigated. Von Karman's equations for large deformation of a thin plate are modified to include the effect of the unilateral elastic foundation. The coupled equations in terms of the plate vertical displacement and the stress function are discretized using the finite-difference method, and then solved using an incremental-iterative algorithm. Results for a circular plate with a central point load are reported for different cases. The large-deformation analysis shows that as the load increases, the contact area tends to expand until full contact is reached. The effects of the foundation modulus and the level of loading on the size of the contact zone and the plate displacement are also investigated. -Author